CLAIMS

What is claimed is:

1. In a computer system, a method of aligning scanned images, comprising:

convolving a scanned image with a filter, the scanned image including a first pattern that the filter will convolve into a second pattern in a convolved image; and

aligning the scanned image according to a position of the second pattern in the convolved image.

2. The method of claim 1, wherein convolving a scanned image with a filter comprises setting a convolved pixel to a difference between a selected odd pixel and a selected even pixel of the first pattern.

3. The method of claim 2, wherein the selected odd pixel has the lowest intensity of the odd pixels and the selected even pixel has the highest intensity of the even pixels, if the average intensity of the odd pixels is greater than the average intensity of the even pixels.

4. The method of claim 2, wherein the selected odd pixel has the highest intensity of the odd pixels and the selected even pixel has the lowest intensity of the even pixels, if the average intensity of the odd pixels is not greater than the average intensity of the even pixels.

5. The method of claim 1, wherein the first pattern is a checkerboard pattern.

6. The method of claim 1, wherein the second pattern is a grid pattern.

7. The method of claim 1, wherein aligning the scanned image comprises aligning a grid over the scanned image.

8. The method of claim 7, further comprising adjusting the position of the grid to minimize a sum of the intensities of pixels along a direction in the grid.

9. The method of claim 1, wherein the scanned image includes multiple copies of the first pattern.

10. The method of claim 9, wherein the scanned image is a rectangle with a copy of the first pattern near each corner.

11. A computer program product that aligns scanned images, comprising:

computer code that convolves a scanned image with a filter, the scanned image including a first pattern that the filter will convolve into a second pattern in a convolved image;

computer code that aligns the scanned image according to a position of the second pattern in the convolved image; and

a computer readable medium that stores the computer codes.

12. A method of aligning scanned images, comprising:

synthesizing a chip having attached nucleic acid sequences, the chip including a first pattern of nucleic acid sequences;

hybridizing labeled nucleic acid sequences to nucleic acid sequences on the chip;

scanning the hybridized chip to produce a scanned image;

convolving the scanned image with a filter, the filter convolving the first pattern into a second pattern in a convolved image; and

aligning the scanned image according to a position of the second pattern in the convolved image.

13. The method of claim 12, wherein convolving the scanned image with a filter comprises setting a convolved pixel to a difference between a selected odd pixel and a selected even pixel of the first pattern.

14. The method of claim 13, wherein the selected odd pixel has the lowest intensity of the odd pixels and the selected even pixel has the highest intensity of the even pixels, if the average intensity of the odd pixels is greater than the average intensity of the even pixels.

15. The method of claim 13, wherein the selected odd pixel has the highest intensity of the odd pixels and the selected even pixel has the lowest intensity of the even pixels, if the average intensity of the odd pixels is not greater than the average intensity of the even pixels.

16. The method of claim 12, wherein the first pattern is a checkerboard pattern.

17. The method of claim 16, wherein the labeled nucleic acid sequences include control nucleic acid sequences that hybridize to alternating squares in the checkerboard pattern.

18. The method of claim 12, wherein the second pattern is a grid pattern.

19. The method of claim 12, wherein aligning the scanned image comprises aligning a grid over the scanned image.

20. The method of claim 19, further comprising adjusting the position of the grid to minimize a sum of the intensities of pixels along a direction in the grid.

21. The method of claim 12, wherein the scanned image includes multiple copies of the first pattern.

22. The method of claim 21, wherein the scanned image is a rectangle with a copy of the first pattern near each corner.

23. A computer program product that aligns scanned images, comprising:

computer code that receives as input a scanned image of a chip having attached nucleic acid sequences to which labeled nucleic acid sequences are hybridized, the chip including a first pattern of nucleic acid sequences;

computer code that convolves the scanned image with a filter, the filter convolving the first pattern into a second pattern in a convolved image;

computer code that aligns the scanned image according to a position of the second pattern in the convolved image; and

a computer readable medium that stores the computer codes.